

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

1-42. (Canceled)

43. (Original) A composition comprising:

a mutated glucose/galactose binding protein having at least one amino acid substitution selected from the group consisting of a cysteine at position 1, a serine at position 1, a cysteine at position 11, a cysteine at position 14, a cysteine at position 19, a cysteine at position 43, a cysteine at position 74, a cysteine at position 107, a cysteine at position 110, a cysteine at position 112, a cysteine at position 113, a cysteine at position 137, a cysteine at position 149, a cysteine at position 213, a cysteine at position 216, a cysteine at position 238, a cysteine at position 287, a cysteine at position 292, a cysteine at position 236, and a cysteine at position 296.

44. (Original) The composition of claim 43 wherein said mutated glucose/galactose binding protein additionally comprises at least one histidine tag.

45. (Original) The composition of claim 43 wherein said mutated glucose/galactose binding protein additionally comprises at least one reporter group.

46. (Original) The composition of claim 45 wherein at least one reporter group is a luminescent label.

47. (Original) The composition of claim 46 wherein said luminescent label has an excitation wavelength of more than about 600 nanometers.

48. (Original) The composition of claim 46 wherein said luminescent label has an emission wavelength of more than about 600 nanometers.

49. (Original) The composition of claim 46 wherein said luminescent label is covalently coupled to said mutated glucose/galactose binding protein by reacting said mutated binding

protein and at least one member selected from the group consisting of fluorescein, coumarins, rhodamines, 5-TMR1A (tetramethylrhodamine-5-iodoacetamide), (9-(2(or4)-(N-(2-maleimdylethyl)-sulfonamidyl)-4(or 2)-sulfophenyl)-2,3,6,7,12,13,16,17-octahydro-(1H,5H,11H,15H-xantheno(2,3,4-ij:5,6,7-i'j')diquinolizin-18-ium salt) (Texas Red®), 2-(5-(1-(6-(N-(2-maleimdylethyl)-amino)-6-oxohexyl)-1,3-dihydro-3,3-dimethyl-5-sulfo-2H-indol-2-ylidene)-1,3-propyldienyl)-1-ethyl-3,3-dimethyl-5-sulfo-3H-indolium salt (CyTM3), N-((2-iodoacetoxy)ethyl)-N-methylamino-7-nitrobenzoxadiazole (IANBD), 6-acryloyl-2-dimethylaminonaphthalene (acrylodan), pyrene, 6-amino-2,3-dihydro-2-(2-((iodoacetyl)amino)ethyl)-1,3-dioxo-1H-benz(de)isoquinoline-5,8-disulfonic acid salt (lucifer yellow), 2-(5-(1-(6-(N-(2-maleimdylethyl)-amino)-6-oxohexyl)-1,3-dihydro-3,3-dimethyl-5-sulfo-2H-indol-2-ylidene)-1,3-pentadienyl)-1-ethyl-3,3-dimethyl-5-sulfo-3H-indolium salt (CyTM5), 4-(5-(4-dimethylaminophenyl)oxazol-2-yl)phenyl-N- (2-bromoacetamidoethyl)sulfonamide (Dapoxyl® (2-bromoacetamidoethyl)sulfonamide)), (N- (4,4-difluoro-1,3,5,7-tetramethyl- 4-bora-3a,4a-diaza-s-indacene- 2-yl)iodoacetamide (BODIPY® 507/545 IA), N-(4,4-difluoro-5,7-diphenyl- 4-bora-3a,4a-diaza-s-indacene- 3-propionyl)- N'-iodoacetylenediamine (BODIPY 530/550 IA), 5-((((2-iodoacetyl)amino)ethyl)amino)naphthalene-1-sulfonic acid (1,5-IAEDANS), and carboxy-X-rhodamine, 5/6-iodoacetamide (XRIA 5,6).

50. (Original) A composition comprising: a mutated glucose/galactose binding protein having at least one amino acid substitution selected from the group consisting of a cysteine at position 152 and a cysteine at position 182, and at least one additional insertion, deletion or substitution of an amino acid residue.

51. (Original) The composition of claim 50 wherein said mutated glucose/galactose binding protein additionally comprises at least one histidine tag.

52. (Original) The composition of claim 50 wherein said mutated glucose/galactose binding protein additionally comprises at least one reporter group.

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53. (Original) The composition of claim 52 wherein at least one reporter group is a luminescent label.
54. (Original) The composition of claim 53 wherein said luminescent label has an excitation wavelength of more than about 600 nanometers.
55. (Original) The composition of claim 53 wherein said luminescent label has an emission wavelength of more than about 600 nanometers.
56. (Original) The composition of claim 53 wherein said luminescent label is covalently coupled to said mutated glucose/galactose binding protein by reacting said mutated binding protein and at least one member selected from the group consisting of fluorescein, coumarins, rhodamines, 5-TMR1A (tetramethylrhodamine-5-iodoacetamide), (9-(2(or4)-(N-(2-maleimidyethyl)-sulfonamidyl)-4(or 2)-sulfophenyl)-2,3,6,7,12,13,16,17-octahydro-(1H,5H,11H,15H-xantheno(2,3,4-ij:5,6,7-ij')diquinolizin-18-ium salt) (Texas Red®), 2-(5-(1-(6-(N-(2-maleimidyethyl)-amino)-6-oxohexyl)-1,3-dihydro-3,3-dimethyl-5-sulfo-2H-indol-2-ylidene)-1,3-propyldienyl)-1-ethyl-3,3-dimethyl-5-sulfo-3H-indolium salt (Cy™3), N-((2-iodoacetoxy)ethyl)-N-methylamino-7-nitrobenzoxadiazole (IANBD), 6-acryloyl-2-dimethylaminonaphthalene (acrylodan), pyrene, 6-amino-2,3-dihydro-2-(2-((iodoacetyl)amino)ethyl)-1,3-dioxo-1H-benz(de)isoquinoline-5,8-disulfonic acid salt (lucifer yellow), 2-(5-(1-(6-(N-(2-maleimidyethyl)-amino)-6-oxohexyl)-1,3-dihydro-3,3-dimethyl-5-sulfo-2H-indol-2-ylidene)-1,3-pentadienyl)-1-ethyl-3,3-dimethyl-5-sulfo-3H-indolium salt (Cy™5), 4-(5-(4-dimethylaminophenyl)oxazol-2-yl)phenyl-N-(2-bromoacetamidoethyl)sulfonamide (Dapoxyl® (2-bromoacetamidoethyl)sulfonamide)), (N-(4,4-difluoro-1,3,5,7-tetramethyl-4-bora-3a,4a-diaza-s-indacene-2-yl)iodoacetamide (BODIPY® 507/545 IA), N-(4,4-difluoro-5,7-diphenyl-4-bora-3a,4a-diaza-s-indacene-3-propionyl)-N'-iodoacetylenediamine (BODIPY 530/550 IA), 5-((((2-iodoacetyl)amino)ethyl)amino)naphthalene-1-sulfonic acid (1,5-IAEDANS), and carboxy-X-rhodamine, 5/6-iodoacetamide (XRIA 5,6).
57. (Currently Amended) A composition comprising:

a mutated *E. coli* glucose/galactose binding protein having at least two amino acid substitutions selected from the group consisting of a cysteine at position 112 and a serine at position 238, a cysteine at position 149 and a serine at position 238, a cysteine at position 152 and a serine at position 213, a cysteine at position 213 and a cysteine at position 238, a cysteine at position 149 and an arginine at position 213, a cysteine at position 149 and a cysteine at position 213, a cysteine at position 149 and a threonine at position 213, a cysteine at position 149 and a leucine at position 213, a cysteine at position 149 and a tyrosine at position 213, a cysteine at position 149 and a serine at position 213, a cysteine at position 149 and an asparagine at position 223, a cysteine at position 149 and a cysteine at position 238, a cysteine at position 149 and a serine at position 256, a cysteine at position 149 and an arginine at position 256, a cysteine at position 152 and an arginine at position 213, a cysteine at position 152 and an asparagine at position 223, a cysteine at position 213 and a cysteine at position 255.

58. (Original) The composition of claim 57 wherein said mutated glucose/galactose binding protein additionally comprises at least one histidine tag.

59. (Original) The composition of claim 57 wherein said mutated glucose/galactose binding protein additionally comprises at least one reporter group.

60. (Original) The composition of claim 59 wherein said reporter group is a luminescent label.

61. (Original) The composition of claim 60 wherein said luminescent label has an excitation wavelength of more than about 600 nanometers.

62. (Original) The composition of claim 60 wherein said luminescent label has an emission wavelength of more than about 600 nanometers.

63. (Original) The composition of claim 60 wherein said luminescent label is covalently coupled to said mutated glucose/galactose binding protein by reacting said mutated binding protein and at least one member selected from the group consisting of fluorescein, coumarins, rhodamines, 5-TMR1A (tetramethylrhodamine-5-iodoacetamide), (9-(2(or4)-(N-(2-

maleimdylethyl)-sulfonamidyl)-4(or 2)-sulfophenyl)-2,3,6,7,12,13,16,17-octahydro-(1H,5H,11H,15H-xantheno(2,3,4-ij:5,6,7-i'j')diquinolizin-18-ium salt) (Texas Red®), 2-(5-(1-(6-(N-(2-maleimdylethyl)-amino)-6-oxohexyl)-1,3-dihydro-3,3-dimethyl-5-sulfo-2H-indol-2-ylidene)-1,3-propyldienyl)-1-ethyl-3,3-dimethyl-5-sulfo-3H-indolium salt (Cy™3), N-((2-iodoacetoxy)ethyl)-N-methylamino-7-nitrobenzoxadiazole (IANBD), 6-acryloyl-2-dimethylaminonaphthalene (acrylodan), pyrene, 6-amino-2,3-dihydro-2-(2-((iodoacetyl)amino)ethyl)-1,3-dioxo-1H-benz(de)isoquinoline-5,8-disulfonic acid salt (lucifer yellow), 2-(5-(1-(6-(N-(2-maleimdylethyl)-amino)-6-oxohexyl)-1,3-dihydro-3,3-dimethyl-5-sulfo-2H-indol-2-ylidene)-1,3-pentadienyl)-1-ethyl-3,3-dimethyl-5-sulfo-3H-indolium salt (Cy™5), 4-(5-(4-dimethylaminophenyl)oxazol-2-yl)phenyl-N- (2-bromoacetamidoethyl)sulfonamide (Dapoxyl® (2-bromoacetamidoethyl)sulfonamide)), (N- (4,4-difluoro-1,3,5,7-tetramethyl- 4-bora-3a,4a-diaza-s-indacene- 2-yl)iodoacetamide (BODIPY® 507/545 IA), N-(4,4-difluoro-5,7-diphenyl- 4-bora-3a,4a-diaza-s-indacene- 3-propionyl)- N'-iodoacetylenethylenediamine (BODIPY 530/550 IA), 5-((((2-iodoacetyl)amino)ethyl)amino)naphthalene-1-sulfonic acid (1,5-IAEDANS), and carboxy-X-rhodamine, 5/6-iodoacetamide (XRIA 5,6).

64. (Original) A composition comprising:

a mutated glucose/galactose binding protein having at least three amino acid substitutions selected from the group consisting of a cysteine at position 149, a serine at position 213 and a serine at position 238; a cysteine at position 149, an arginine at position 213 and a serine at position 238; a cysteine at position 149, a cysteine at position 213 and a cysteine at position 238; a cysteine at position 149, a serine at position 213 and an asparagine at position 223; a cysteine at position 149, an asparagine at position 223 and an arginine at position 256; a cysteine at position 149, an arginine at position 213 and a cysteine at position 238; and a cysteine at position 149, a cysteine at position 213 and a serine at position 238.

65. (Original) The composition of claim 64 wherein said mutated glucose/galactose binding protein additionally comprises at least one histidine tag.

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66. (Original) The composition of claim 64 wherein said mutated glucose/galactose binding protein additionally comprises at least one reporter group.
67. (Original) The composition of claim 66 wherein said reporter group is a luminescent label.
68. (Original) The composition of claim 67 wherein said luminescent label has an excitation wavelength of more than about 600 nanometers.
69. (Original) The composition of claim 67 wherein said luminescent label has an emission wavelength of more than about 600 nanometers.
70. (Original) The composition of claim 67 wherein said luminescent label is covalently coupled to said mutated glucose/galactose binding protein by reacting said mutated binding protein and at least one member selected from the group consisting of fluorescein, coumarins, rhodamines, 5-TMR1A (tetramethylrhodamine-5-iodoacetamide), (9-(2(or4)-(N-(2-maleimidyethyl)-sulfonamidyl)-4(or 2)-sulfophenyl)-2,3,6,7,12,13,16,17-octahydro-(1H,5H,11H,15H-xantheno(2,3,4-ij:5,6,7-ij')diquinolizin-18-ium salt) (Texas Red®), 2-(5-(1-(6-(N-(2-maleimidyethyl)-amino)-6-oxohexyl)-1,3-dihydro-3,3-dimethyl-5-sulfo-2H-indol-2-ylidene)-1,3-propyldienyl)-1-ethyl-3,3-dimethyl-5-sulfo-3H-indolium salt (CyTM3), N-((2-iodoacetoxy)ethyl)-N-methylamino-7-nitrobenzoxadiazole (IANBD), 6-acryloyl-2-dimethylaminonaphthalene (acrylodan), pyrene, 6-amino-2,3-dihydro-2-(2-((iodoacetyl)amino)ethyl)-1,3-dioxo-1H-benz(de)isoquinoline-5,8-disulfonic acid salt (lucifer yellow), 2-(5-(1-(6-(N-(2-maleimidyethyl)-amino)-6-oxohexyl)-1,3-dihydro-3,3-dimethyl-5-sulfo-2H-indol-2-ylidene)-1,3-pentadienyl)-1-ethyl-3,3-dimethyl-5-sulfo-3H-indolium salt (CyTM5), 4-(5-(4-dimethylaminophenyl)oxazol-2-yl)phenyl-N-(2-bromoacetamidoethyl)sulfonamide (Dapoxyl® (2-bromoacetamidoethyl)sulfonamide)), (N-(4,4-difluoro-1,3,5,7-tetramethyl-4-bora-3a,4a-diaza-s-indacene-2-yl)iodoacetamide (BODIPY® 507/545 IA), N-(4,4-difluoro-5,7-diphenyl-4-bora-3a,4a-diaza-s-indacene-3-propionyl)-N'-iodoacetylenediamine (BODIPY 530/550 IA), 5-(((2-iodoacetyl)amino)ethyl)

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amino)naphthalene-1-sulfonic acid (1,5-IAEDANS), and carboxy-X-rhodamine, 5/6-iodoacetamide (XRIA 5,6).

71. (Original) A composition comprising:

a mutated glucose/galactose binding protein having at least four amino acid substitutions selected from the group consisting of a serine at position 1, a cysteine at position 149, an arginine at position 213 and a serine at position 238; a serine at position 1, a cysteine at position 149, a serine at position 213 and a serine at position 238; and a cysteine at position 149, a cysteine at position 182, a cysteine at position 213 and a serine at position 238.

72. (Original) The composition of claim 71 wherein said mutated glucose/galactose binding protein additionally comprises at least one histidine tag.

73. (Original) The composition of claim 71 wherein said mutated glucose/galactose binding protein additionally comprises at least one reporter group.

74. (Original) The composition of claim 73 wherein said reporter group is a luminescent label.

75. (Original) The composition of claim 74 wherein said luminescent label has an excitation wavelength of more than about 600 nanometers.

76. (Original) The composition of claim 74 wherein said luminescent label has an emission wavelength of more than about 600 nanometers.

77. (Original) The composition of claim 74 wherein said luminescent label is covalently coupled to said at least one glucose/galactose binding protein by reaction with said at least one mutated binding protein and a member selected from the group consisting of fluorescein, coumarins, rhodamines, 5-TMRIA (tetramethylrhodamine-5-iodoacetamide), (9-(2(or4)-(N-(2-maleimdylethyl)-sulfonamidyl)-4(or 2)-sulfophenyl)-2,3,6,7,12,13,16,17-octahydro-(1H,5H,11H,15H-xantheno(2,3,4-ij:5,6,7-i'j')diquinolizin-18-ium salt) (Texas Red®), 2-(5-(1-(6-(N-(2-maleimdylethyl)-amino)-6-oxohexyl)-1,3-dihydro-3,3-dimethyl-5-sulfo-2H-indol-2-ylidene)-1,3-propyldienyl)-1-ethyl-3,3-dimethyl-5-sulfo-3H-indolium salt (CyTM3), N-((2-

iodoacetoxy)ethyl)-N-methyl)amino-7-nitrobenzoxadiazole (IANBD), 6-acryloyl-2-dimethylaminonaphthalene (acrylodan), pyrene, 6-amino-2,3-dihydro-2-(2-((iodoacetyl)amino)ethyl)-1,3-dioxo-1H-benz(de)isoquinoline-5,8-disulfonic acid salt (lucifer yellow), 2-(5-(1-(6-(N-(2-maleimidylethyl)-amino)-6-oxohexyl)-1,3-dihydro-3,3-dimethyl-5-sulfo-2H-indol-2-ylidene)-1,3-pentadienyl)-1-ethyl-3,3-dimethyl-5-sulfo-3H-indolium salt (CyTM5), 4-(5-(4-dimethylaminophenyl)oxazol-2-yl)phenyl-N- (2-bromoacetamidoethyl)sulfonamide (Dapoxyl® (2-bromoacetamidoethyl)sulfonamide)), (N- (4,4-difluoro-1,3,5,7-tetramethyl- 4-bora-3a,4a-diaza-s-indacene- 2-yl)iodoacetamide (BODIPY® 507/545 IA), N-(4,4-difluoro-5,7-diphenyl- 4-bora-3a,4a-diaza-s-indacene- 3-propionyl)- N'-iodoacetylenediamine (BODIPY 530/550 IA), 5-((((2-iodoacetyl)amino)ethyl)amino)naphthalene-1-sulfonic acid (1,5-IAEDANS), and carboxy-X-rhodamine, 5/6-iodoacetamide (XRIA 5,6).

78. (Previously Presented) The composition of claim 57, wherein said mutated glucose/galactose binding protein additionally comprises two luminescent reporter groups covalently coupled to said binding protein.

79. (Previously Presented) The composition of claim 78, wherein said two luminescent reporter groups are both N-((2-iodoacetoxy)ethyl)-N-methyl)amino-7-nitrobenzoxadiazole (IANBD), or wherein one of said luminescent reporter groups is N-((2-iodoacetoxy)ethyl)-N-methyl)amino-7-nitrobenzoxadiazole (IANBD) and the other said luminescent reporter group is (9-(2(or4)-(N-(2-maleimidylethyl)-sulfonamidyl)-4(or 2)-sulfophenyl)-2,3,6,7,12,13,16,17-octahydro-(1H,5H,11H,15H-xantheno(2,3,4-ij:5,6,7-i'j')diquinolizin-18-ium salt) (Texas Red®).

80. (Previously Presented) The composition of claim 64, wherein said mutated glucose/galactose binding protein additionally comprises two luminescent reporter groups covalently coupled to said binding protein.

81. (Previously Presented) The composition of claim 80, wherein said two luminescent reporter groups are both N-((2-iodoacetoxy)ethyl)-N-methyl)amino-7-nitrobenzoxadiazole (IANBD), or wherein one of said luminescent reporter groups is N-((2-iodoacetoxy)ethyl)-N-

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methyl)amino-7-nitrobenzoxadiazole (IANBD) and the other said luminescent reporter group is (9-(2(or4)-(N-(2-maleimidyethyl)-sulfonamidyl)-4(or 2)-sulfophenyl)-2,3,6,7,12,13,16,17-octahydro-(1H,5H,11H,15H-xantheno(2,3,4-ij:5,6,7-i'j')diquinolizin-18-ium salt) (Texas Red®).

82. (Previously Presented) The composition of claim 71, wherein said mutated glucose/galactose binding protein additionally comprises two luminescent reporter groups covalently coupled to said binding protein.

83. (Previously Presented) The composition of claim 82, wherein said two luminescent reporter groups are both N-((2-iodoacetoxy)ethyl)-N-methyl)amino-7-nitrobenzoxadiazole (IANBD), or wherein one of said luminescent reporter groups is N-((2-iodoacetoxy)ethyl)-N-methyl)amino-7-nitrobenzoxadiazole (IANBD) and the other said luminescent reporter group is (9-(2(or4)-(N-(2-maleimidyethyl)-sulfonamidyl)-4(or 2)-sulfophenyl)-2,3,6,7,12,13,16,17-octahydro-(1H,5H,11H,15H-xantheno(2,3,4-ij:5,6,7-i'j')diquinolizin-18-ium salt) (Texas Red®).